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individual and family; for Mr. Galton, more than any one else, has brought home to us the fact of our close dependence upon our ancestors for our traits of body, mind, and character. Mr. Galton's two small volumes provide most admirably for the facts in individual cases. The thicker of the two, the life-history album, will undoubtedly be the most widely used. It provides for the systematic record of the principal facts which may serve to indicate the constitutional character and the course of development of an individual from birth to seventy-five years of age. Directions, admirable in clearness and simplicity, are prefixed to the volume. The first of the blank tables that follow is for a brief genealogical record; the second, for the description of the child at birth. The remainder of the record is divided into five yearly periods. For each period the headings and blanks are repeated, so that the same qualities may be traced through all their changes. The data to be entered are of four kinds: first, physical characteristics, the stature, complexion, acuteness of the senses, etc.; second, other peculiarities, bodily endurance, recent trial of mental power, artistic capacity, resemblance to relatives; third, photographs in profile and full face; fourth, any other observations, including especially the full medical history. There are also charts on which to record graphically the growth; and these charts also give the curves of average growth for males and females. At the end of the volume are a few pages for records of the wife (or husband) and children. An appendix gives tests for vision.

Only those having experience can appreciate the study and thought which have been expended upon this remarkable album,—the product of a noble and wise philanthropy. Parents who earnestly desire their children's welfare will gradually learn to recognize the necessity of profiting by Mr. Galton's guidance in preserving a knowledge of their children's lives, for the plan which he has formulated can hardly be improved at present. Such knowledge is valuable to the child, not only as indicating its constitutional tendencies, but also often as giving warning of incipient disease, and as

revealing the influence of change in residence, occupation, diet, or habits, upon health. More valuable still will the accurately kept album be when the child becomes a parent.

"For mental and physical characteristics, as well as liabilities to disease, are all transmitted more or less by parents to their children. . . . The world is beginning to perceive that the life of each individual is in some real sense a prolongation of those of his ancestry. His character, his vigor, and his disease are principally theirs. . . . The life-histories of our relatives are, therefore, more instructive to us than those of strangers: they are especially able to forewarn and encourage us, for they are prophetic of our own futures."

The thinner volume is designed especially to further the science of heredity by gathering histories of families. It is arranged to contain brief records of the principal traits, bodily and psychic, of a person, and the person's parents, grand-parents, great-grand-parents, and children. Those who are able to do so, can render a valuable service, not only to themselves, but also to knowledge, by filling out accurately a record of their family faculties, and transmitting a duplicate to Mr. Galton, who will use it as a confidential document for statistical purposes only. That he will draw most valuable deductions from such materials, those who know his earlier researches are convinced beforehand. The album of family faculties has the same general plan and excellences, and deserves the same general praise, as the life-album.

Of the laws of heredity, but little is really known; but, when they are better and more generally understood, a great revolution must ensue in human society. Mr. Galton is laying the foundation of a thorough knowledge of heredity; and, because imagination hastens to conceive the future changes that may result, we are inclined to designate Mr. Galton's two recent publications as the most important books of the year. But in such matters, wisdom may be boldness in theory, but must be conservatism in practice: therefore let us diligently gather knowledge of heredity, and meanwhile postpone the anticipated revolution.

To all persons we earnestly recommend the faithful use of the two volumes we have reviewed.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

U. S. geological survey.

Fulgorite from Oregon.—During Mr. Diller's reconnoissance of the Cascade Range in the summer of

1883, Mr. E. E. Hayden collected from the summit of Mount Thielsen, one of the sharpest and most precipitous peaks in the Cascade south of the Columbia, specimens of fulgorite, the product resulting from the

fusion of rock-masses by lightning. The greater portion of Mr. Diller's time in April was devoted to the study of this rock, which was deemed worthy of special examination, not only on account of its rarity, but also from the fact that it presents the opportunity to study the products of an uncommon method of fusion. While the formation of fulgurite in sand is of frequent occurrence, it is only exceptionally produced in solid rock. The most important locality where it has been heretofore discovered in solid rock is Little Ararat in Armenia reported by Abich. Upon the specimen collected by him, Wichmann has made a brief microscopical research. An endeavor is being made to obtain some of the fulgurite of Little Ararat for comparison with the Oregon specimens.

Sauvage mentions glazed hornblende schist as occurring on the summit of Mont Blanc; Humboldt reports fulgurite from one of the peaks in Mexico; Ramond saw it at several points in the Pyrenees and the Auvergne: but these occurrences have never been investigated.

Mr. Diller prepared a number of delicate, thin sections of the fulgurite from Mount Thielsen; and its relation to the various constituents of the rock has been very clearly made out. A chemical analysis has been made by Prof. F. W. Clarke.

The material fused by the lightning was cooled so quickly that it all remained amorphous, and formed a dark, porous glass. In order to test the conclusions reached in the microscopical analysis, an attempt was made to crystallize the fulgurite. A completely amor-

phous fragment was heated without fusion in a Bunsen lamp for six hours, and then found, in polarized light, to be made up of strongly doubly refracting fibres, with a marked tendency to spherulitic arrangement. A finely pulverized portion was fused, and as highly heated as possible in a blast-lamp for four hours and three-quarters, and then allowed to cool gradually. Under the microscope, it was found that much of the felspar, some pyroxene, and many undeterminable microlites, crystallized out of the glass during the heating. The various stages in the development of felspar crystals from more or less regular groups of microlites, through lathe-shaped bundles of fibres to a completely clear, transparent crystal, are easily traced. The microscopical as well as the chemical evidence, and that derived from the re-crystallization of the fulgurite, all indicate that the fusion was confined chiefly to the siliceous groundmass of the rock with which the fulgurite is associated. The rhombic pyroxene was also fused to some extent, while the plagioclase felspar and olivine were not affected. The examination also indicates that the composition of the glass derived from the fusion of parts of a heterogeneous rock is a function of the fusibility and electric resistance of its various constituents.

The basaltic rock on which the fulgurite has been found is unique in the character of its pyroxene. The various mineral constituents of the rock are now being separated, for the purpose of a chemical analysis, by means of Thoulet's solution.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Brooklyn entomological society.

May 31. — Mr. Roberts gave an account of the habits of the Elmidae, a large number of which were collected by him at the Clifton excursion. — Mr. Schwensen called attention to the food-habits of some species of the Chrysomelidae, belonging or allied to *Cryptocephalus*. Many species are, in his experience, omnivorous; others, found only on certain groups of plants.

Academy of natural sciences, Philadelphia.

May 20. — Mr. Joseph Willcox stated, that, on the west coast of Florida, shell-mounds are very numerous, indicating the former favorite camping-grounds of Indians. The largest accumulation of shells is at Cedar Keys. A portion of the town is built on the mounds; and great quantities of the material, consisting almost entirely of oyster-shells, have been used in grading the streets. Human bones, stone implements, and fragments of pottery, are frequently found among the shells. Although Professor Wyman, in his memoir on Florida shell-heaps, asserts that stone chips are not common, being only found separately or a few together, and in no case indicating a place for the manufacture of arrow-heads or other implements,

such a place of manufacture may be seen on John's Island, at the mouth of the Cheeshowiska River. Several bushels of chips are here scattered about, all made of the chert rock, the only material in Florida suitable for the purpose. — Professor Heilprin, referring to the Foraminifera found in the rock-masses from Florida, stated, that, after a careful search, he had been able to add but one genus, *Sphaeroidina*, to those before enumerated. It was, he believed, the first time that any of the genera named at the meeting of April 22, except *Orbitoides*, had been discovered in America. He had also found another species of *Nummulites*, making, with *N. Willcoxii*, the second American form. The new species is twice the size of that named; and the septa are more numerous, and bent at a more acute angle. Two additional forms of *Orbitoides* had been determined, the presence of one of which, *O. ephippium*, places beyond doubt the oligocene age of the deposits containing it. — Mr. Thomas Meehan exhibited flowers of the remarkable *Halesia*, the striking variation in the leaves and seeds of which had formed the subject of a former communication. The flowers of the sport are cup-shaped instead of tubular; and the wide divergence reached without any intervening modifications was another illustration of the fact that the maxim of